ANNA UNIVERSITY
Chennai-25.
Syllabus for
M.E.(Full Time) Communication Systems

CM141	**Modern Digital Communication Techniques**	**3**	**0**	**0**	**100**

1. INTRODUCTION **9**

Functional architecture coded and encoded digital communication system architecture,Types of network and services,Performance criterion and link budgets

2. DIGITAL MODULATIONS **9**

PSD ,Dta pulse stream,M-ary Markov source,convolutionally coded modulation,continuous phase modulation(CPM),Scalar and vector communications over memory less channel,scalar reciever,BER Performance,dtection criterion

3. COHERENT AND NON-COHERENT COMMUNICATION WITH WAVEFORMS **9**

Optical reciever in WGN,MF reciever,Matrix generation,colored GN,Whitening approach,Inphase and Quadrature phase modem,Non-coherent recievers,Random phase channel,Optimum and suboptimum M-FSK,Performance of Non-coherent Recievers in Random phase channel,optimum recievers in Rayleigh and Rician channels,M-ary symbol error probability

4. BAND LIMITED CHANNELS **9**

Optimum pulse shape design,optimum demodulations of digital signals in the presence of ISI and AWGN,equalization otechniques,diminishing and detectionI-Q modulation,QAM,QPSK,QBM,CPM,FSK,MSK

5. CODED DIGITAL COMMUNICATION **9**

Architecture,interfacing,detailing,Synchronization ,block coded digital communication system,performance,types of binary block codes,Shannon channel coding theorem,linear block codes,convolutional coded digital communication system,representation of convolution codes,decoding,problems of decreasing errors , sequencing and threshold decoding

Total No of periods: 45

CM141 Modern Digital Communication Techniques 3 0 0 100

References:S:
1. `M.K.Simon,S.M.Hinedi and W.C.Lindsey,Digital communication techniques:signalling and detection,Prentice Hall India,New Delhi. 1995
2. Simon Haykin,Digital communications,John Wiley and sons,1998
3. Wayne Tomasi,Advanced Electronic communication systems,4th Edition,Pearson Education Asia,1998
4. B.P.Lathi,Modern Digital and analog communication systems,3rd Edition,Oxford University Press,1998.

CM142	**Advanced Radiation Systems**	**3**	**0**	**0**	**100**

1. BASICS CONCEPTS OF RADIATION **9**

Radiation from surface current and current line current distribution,Basic antenna parameters,Radiation mechanism-Current distribution ofn Antennas,Impedance concept-Balance dto Unbalanced transformer

2. RADIATION FROM APERTURES **9**

Field equivalence principle,Rectangular and circular apertures,Uniform distribution on an infinite ground plane,Aperture fields of Horn antenna-Babinets principle,Geometrical theory of diffgraction,Reflector antennas,Design considerations - Slot antennas

3. SYNTHESIS OF ARRAY ANTENNAS **9**

Types of linear arrays,current distribution in linear arrrays,Phased arrays,Optimization of Array patterns,Continuous aperture sources,Antenna synthesis techniques

4. MICRO STRIP ANTENNAS **9**

Radiation mechanisms,Feeding structure,Retangular patch,Circular patch,Ring antenna.Input impedance of patch antenna,Microstrip dipole,Microstrip arrays

5. EMI S/EMC/ANTENNA MEASUREMENTS **9**

Log periodic,Bi-conical,Log spiral ridge Guide,Multi turn loop,Travelling Wave antenna,Antenna measurement and instrumenatation ,Amplitude and Phase measurement,Gain,Directivity.Impedance and polarisation measurement,Antenna range,Design and Evaluation

Total No of periods: 45

CM142	**Advanced Radiation Systems**	**3**	**0**	**0**	**100**

References:S:
1. Kraus.J.D.,"Antennas"II Edition,John wiley and Sons ,1997
2. Balanis.A, "Antenna Theory Analysis and Design",John Wiley and Sons,New York,1982
3. Collin.R.E. and Zucker.F.,"Antenna Theory"Part I,Mc Graw Hill,New York,1969

CM144 Multimedia Compression Techniques **3 0 0 100**

1. INTRODUCTION **9**

Brief history of data compression applications,Overview of information theory,redundancy.Overview of Human audio,Visual systems,Taxonomy of compression techniques.Overview of source coding,,source models,scalar quantisation theory,rate distribution theory,vector quantisation,structure quanitizers.Evaluation techniques-error analysis and methodologies

2. TEXT COMPRESSION **9**

Compact techniques-Huffmann coding-arithmatic coding-Shannon-Fano coding and dictionary techniques-LZW family algorithms.Entropy measures of performance-Quality measures.

3. AUDIO COMPRESSION **9**

Audio compression techniques-frequency domain and filtering-basic subband coding-application to speech coding-G.722-application to audio coding-MPEG audio,progressive encoding for audio--silence compression,speech compression techniques-Vocoders

4. IMAGE COMPRESION **9**

Predictive techniques-PCM,DPCM,DM.Contour based compression-quadtrees,EPIC,SPIHT,Transform coding,JPEG,JPEG-2000,JBIG

5. VIDEO COMPRESSION **9**

Video signal representation,Video compression techniques-MPEG,Motion estimation technioques-H.261.Overview of Wavelet based compression and DVI technology,Motion video compression,PLV performance,DVI real time compression

Total No of periods: 45

CM144	**Multimedia Compression Techniques**	**3**	**0**	**0**	**100**

References:S:
1. Mark Nelson,Dta compression book,BPB Publishers,New Delhi,1998
2. Sayood Khaleed,Introduction to data compression,Morgan Kauffman,London,1995
3. Watkinson,J.Compression in video and audio,Focal press,London.1995
4. Jan Vozer,Video compression for multimedia,AP profes,NewYork,1995.

MA151	**Applied Mathematics for Electronics Engineers**	**3**	**1**	**0**	**100**

1. THE WAVE EQUATIONS **10**

Solution of initial and boundary value problems- Characteristics- D'Alembert's Solution - Significance of characteristic curves - Laplace transform solutions for displacement in a long string- a long string under its weight - a bar with prescribed force on one end- free vibrations of a string.

2. SPECIAL FUNCTIONS **13**

Series solutions- Bessel's equation - Bessel Functions-Legendre's equation - Legendre polynomials - Rodrigue's formula - Recurrence relations- generating functions and orthogonal property for Bessel functions of the first kind - Legendre polynomials.

3. PROBABILITY AND RANDOM VARIABLES **12**

Probability Concepts -Random Variables, Moment generating function - standard distributions- Two dimensional random variables- Transformation of Random Variables - Correlation - Regression system - queueing applications.

4. QUEUEING THEORY **10**

Single and Multiple server Markovian queueing models - customer impatience - Priority queues - M/G/1 queueing system - queueing applications.

5. TUTORIALS **15**

Total No of periods: 60

MA151 Applied Mathematics for Electronics Engineers 3 1 0 100

References:

1. Sankara Rao.K. " Introduction to Partial Differential Equation ", PHI, 1995.
2. Taha. H.A., " Operations Research- An Introduction " 6th Edition, PHI, 1997.
3. Churchil. R.V., " Operational Mathematics ", McGraw Hill, 1972.
4. Richard A.Johnson, Miller and Freund's Probability and Statistics for Engineers, 5th Edition, PHI, 1994.
5. S.Narayanan, T.K.Manickvachagam Pillay and G.Ramanaiah - " Advanced Mathematics for Engineering Students " Vol.II, S.Viswanathan Pvt. Ltd., 1986.

OC131	**Optical Fiber Communication**	**3**	**0**	**0**	**100**

1. FIBER OPTIC GUIDES **9**

Light wave generation systems, system components, optical fibers, SI, GI fibers, modes, Dispersion in fibers, limitations due to dispersion, Fiber loss, non linear effects. Dispersion shifted and Dispersion flattened fibers

2. OPTICAL TRANSMITTERS AND RECEIVERS **9**

Basic concepts, LED's structures spectral distribution,semiconductor lasers, gain coefficients, modes, SLM and STM operation,Transmitter design, Reciever PIN and APD diodes design, noise sensititvity and degradation, Receiver amplifier design.

3. LIGHT WAVE SYSTEM **9**

Coherent, homodyne and heterodyne keying formats, BER in synchronous- and asunchronous-receivers, sensitivity degradation, system performance, Multichannel, WDM, multiple access networks, WDM components, TDM, Subcarrier and Code division multiplexing.

4. AMPLIFIERS **9**

Basic concepts, Semiconductor laser amplifiers, Raman - and Brillouin - fiber amplifiers, Erbium doped - fiber amplifiers, pumping phenomenon, LAN and cascaded in-line amplifiers.

5. DISPERSION COMPENSATION **9**

Limitations, Post-and Pre-compensation techniques, Equalizing filters, fiber based gratings, Broad band compersation, soliton communication system, fiber soliton, Soliton based communication system design, High capacity and WDM soliton system.

Total No of periods: 45

OC131 Optical Fiber Communication **3 0 0 100**

References:

1. *G.P. Agarwal, " Fiber optic communication systems ", 2nd Edition, John Wiley & Sons, New York, 1997.*
2. *Franz and Jain, " Optical communication system ", Narosa Publications, New Delhi, 1995.*
3. *G.Keiser, " Optical fiber communication ", Systems, McGraw-Hill, New York, 2000.*
4. *Franz & Jain, " Optical comunication ", Systems and components, Narosa Publications, New Delhi, 2000.*

OC131	**Optical Fiber Communication**	**3**	**0**	**0**	**100**

1. FIBER OPTIC GUIDES **9**

Light wave generation systems, system components, optical fibers, SI, GI fibers, modes, Dispersion in fibers, limitations due to dispersion, Fiber loss, non linear effects. Dispersion shifted and Dispersion flattened fibers

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Total No of periods: 45

OC131	**Optical Fiber Communication**	**3**	**0**	**0**	**100**

CM039	**Microwave Integrated Circuits**	**3**	**0**	**0**	**100**

1. MICROSTRIPS LINES,DESIGN,ANALYSIS **9**

Introduction,types of MICs and their technology,Propagating models,Analysis of MIC by conformal transformation,Numerical analysis,Hybrid mode analysis.losses in Microstrip,Introduction to slot line and coplanar wave guide

2. COUPLED MICROSTRIP,DIRECTIONAL COUPLERS AND LUMPED ELEMENTS FOR MICS **9**

Introduction to coupled Microstrip,Even and odd mode analysis,Directional couplers,branch line couplers,Design and Fabrication of Lumped elements for MICs,Comparison with distributd circuits

3. NON-RECIPROCAL COMPONENTS AND ACTIVE DEVICES FOR MICS **9**

Ferromagneticsubstrates and inserts,Microstrip circulators,Phase shifters,Microwave transistors,Parametric diodes and Amplifiers,PIN diodes,Transferred electron devices,IMPATT,BARITT,Avalanche diodes,Microwave transistors circuits

4. MICROSTRIP CIRCUIOT DESIGN AND APPLICATIONS **9**

Introduction,Impedance transformers,Filters,High power circuits,Low power circuits,MICs in satelite and Radar

5. MMIC TECHNOLOGY **9**

Fabrication process of MMIC,Hybrid MICs,Configuration,Dielectric substances,thick and thinfilm technology,Testing mrthods,Encapsulation and mounting of Devices.

Total No of periods: 45

CM039	**Microwave Integrated Circuits**	**3**	**0**	**0**	**100**

References:S:

1. Hoffman R.K."HandBook of Microwave intergrated circuits",Artech House,Boston,1987.
2. Gupta .K.C and Amarjit Singh,"Microwave Intergrated circuits"John Wiley,New York,1975.

CM143	**High Performance Communication Networks**	**3**	**0**	**0**	**100**

1. BASICS OF NETWORKS **9**

Telephone,computer,Cable television and Wireless network,networking principles,Digitilization:Service intergration,network services and layered architecture,traffic charecterization and QOS,networks services:network elements and network mechanisms

2. PACKET SWITCHED NETWORKS **9**

OSI and IP models:Ethernet (IEEE 802.3);token ring(I EEE 802.5),FDDI,DQDB,frame relay,:SMDS:Internet working with SMDS

3. INTERNET AND TCP/IP NETWORKS **9**

Overview;internet protocol;TCP and VDP;performance of TCP/IP networks circuit switched networks:SONET;DWDM,Fibre to home,DSL.Intelligent networks,CATV.

4. ATM AND WIRELESS NETWORKS **9**

Main features-adressing,signalling and routing;ATM headre structure-adaptation layer, management and control;BISDN;Interworking with ATM ,Wireless channel,link level design,channel access;Network designn and wireless networks

5. OPTICAL NETWORKS AND SWITCHING **9**

Optical links- WDM systems,cross-connects ,optical LAN's, optical paths and networks;TDS and SDS:modular switch designs-Packet switching,distributed,shared,input and output buffers

Total No of periods: 45

CM143 High Performance Communication Networks 3 0 0 100

References:

1. *Jean warland and Pravin Varaiya, " High Performance Communication Networks ", 2nd Edition, Harcourt and Morgan Kauffman, London, 2000.*
2. *Leon Gracia, Widjaja, " Communication networks ", Tata McGraw-Hill, New Delhi, 2000.*
3. *Sumit Kasera, Pankaj Sethi, " ATM Networks ", Tata McGraw-Hill, New Delhi, 2000.*
4. *Behrouz.a. Forouzan, " Data Communication and Networking ", Tata McGraw-Hill, New Delhi, 2000.*

CM145	**Satellite Communication**	**3**	**0**	**0**	**100**

1. ORBITAL PARAMETERS **9**

Orbital parameters,Orbital pertubations,Geo stationary orbits,Low Earth and Medium orbits.Frequency selection,Frequency co-ordination and regulatory services,Sun transit outages,Limits of visibility,Attitude and orientation control,Spin stabilisation techniques,Gimbal platform

2. LINK CALCULATIONS **9**

Space craft configuration,Payload and supporting subsystems,Satelite uplink -down link power budget,C/No,G/T,Noise temperature,System noise,Propagation actors,Rain and ice effects,Polarization calculations

3. ACCESS TECHNIQUES **9**

Modulation and Mltiplexing:Voice,Data,Video,Analog and Digital transmission systems,multiple acess techniques:FDMA,TDMA,T1-T2 carrier systems,SPADE,SS-TDMA,CDMA,Assignment Methods,Spread spectrum communication,Compression-Encryption and Decryption techniques

4. EARTH STATION PARAMETERS **9**

Earth station location,propagation effects of ground,High power transmitters-Klystron Crossed field devices,Cassegrania feeds,Measurements on G/T and Eb/No

5. SATELITE APPLICATIONS **9**

INTELSAT Series,INSAT,VSAT,Remotesensing,Moble satelite service:GSM.GPS,INMARSAT,Staelie Navigation System,Direct to Home service(DTH),Special services,E-mail,Video conferencing and Internet connectivity

Total No of periods: 45

CM145	**Satellite Communication**	**3**	**0**	**0**	**100**

References:S:
1. Bruce R.Elbert,"The Satelite CommunicationApplications Hand Book,Artech House Boston,1997
2. Wilbur L.Pritchard,Hendri G.Suyderhood,Robert A.Nelson,"Staelite Communication Systems Engineering",IIEdition,Prentice Hall,New Jersey.1993
3. Dennis Rody," Satelite Communication", Regents/Prentice Hall,Eaglewood Cliff,New Jersey,1983
4. Tri T.Ha,"Digital staelite communiocation",2nd Edition,McGraw Hill,New york.1990
5. K.Feher,Digital communication satelite / Earth Station Engineering, prentice Hall Inc,New Jersey,1983

CM146	**Cellular Mobile Communication**	**3**	**0**	**0**	**100**

1. INTRODUCTION TO WIRELESS MOBILE COMMUNICATIONS **9**

History and evolution of mobile radio systems.Types of mobile wireless services/systems-Cellular,WLL,Paging,Satelite systems,Standards,Future trends in personal wireless systems

2. CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS **9**

Cellular concept and frequency reuse,Multiple Access Schemes,channel assignment and handoff,Interference and system capacity,Trunking and Erlang capacity calculations

3. MOBILE RADIO PROPAGATION **9**

Radio wave propagation issues in personal wireless systems,Propagation models,Multipath fading and Base band impulse respond models,parameters of mobile multipath channels,Antenna systems in mobile radio

4. MODULATION AND SIGNAL PROCESSING **9**

Analog and digital modulation techniques,Performance of various modulation techniques-Spectral efficiency,Error-rate,Power Amplification,Equalizing Rake reciever concepts,Diversity and space-time processing,Speech coding and channel coding

5. SYSTEM EXAMPLES AND DESIGN ISSUES **9**

Multiple Access Techniques-FDMA,TDMA and CDMA systems,operational systems,Wireless networking,design issues in personal wireless systems

Total No of periods: 45

CM146	**Cellular Mobile Communication**	**3**	**0**	**0**	**100**

References:

1. K.Feher,Wireless digital communications,PHI,New Delhi,1995

2. T.S.Rappaport,Wireless digital communications;Principles and practice,Prentice Hall,NJ,1996.

3. W.C.Y.Lee,Mobile communications Engineering:Theory And Applications,Second Edition, McGraw Hill,New York.19908.

4. Schiller,Mobile Communications;Pearson Education Asia Ltd.,2000

AX039 Internetworking Multimedia **3 0 0 100**

1. INTRODUCTION **9**

Digital sound, video and graphics, basic multimedia networking, multimedia characteristics, evolution of Internet services model, network requirements for audio/video transform, multimedia coding and compression for text, image, audio and video.

2. SUBNETWORK TECHNOLOGY **9**

Broadband services, ATM and IP , IPV6, High speed switching, resource reservation, Buffer management, traffic shaping, caching, scheduling and policing, throughput, delay and jitter performance.

3. MULTICAST AND TRANSPORT PROTOCOL **9**

Multicast over shared media network, multicast routing and addressing, scaping multicast and NBMA networks, Reliable transport protocols, TCP adaptation algorithm, RTP, RTCP.

4. MEDIA - ON - DEMAND **9**

Storage and media servers, voice and video over IP, MPEG-2 over ATM/IP, indexing synchronization of requests, recording and remote control.

5. APPLICATIONS **9**

MIME, Peer-to-peer computing, shared application, video conferencing, centralized and distributed conference control, distributed virtual reality, light weight session philosophy.

Total No of periods: 45

AX039 Internetworking Multimedia **3** **0** **0** **100**

References:

1. *Jon Crowcroft, Mark Handley, Ian Wakeman. Internetworking Multimedia, Harcourt Asia Pvt.Ltd.Singapore, 1998.*
2. *B.O. Szuprowicz, Multimedia Networking, McGraw Hill, NewYork. 1995*
3. *Tay Vaughan,Multimedia making it to work, 4ed,Tata McGrawHill, NewDelhi,2000.*

AX131 Advanced Digital Signal Processing **3 0 0 100**

1. DISCRETE RANDOM SIGNAL PROCESSING **9**

Discrete Random Processes, Expectations, Variance, Co -Variance, Scalar Product, Energy of Discrete Signals - Parseval's Theorem, Wiener Khintchine Relation - Power Spectral Density - Periodogram - Sample Autocorrelation - Sum Decomposition Theorem, Spectral Factorization Theorem - Discrete Random Signal Processing by Linear Systems - Simulation of White Noise - Low Pass Filtering of White Noise.

2. SPECTRUM ESTIMATION **9**

Non-Parametric Methods-Correlation Method - Co-Variance Estimator - Performance Analysis of Estimators - Unbiased, Consistent Estimators-Periodogram Estimator-Barlett Spectrum Estimation-Welch Estimation-Model based Approach - AR, MA, ARMA Signal Modeling-Parameter Estimation using Yule-Walker Method.

3. LINEAR ESTIMATION AND PREDICTION **9**

Maximum likelihood criterion-efficiency of estimator-Least mean squared error criterion -Wiener filter-Discrete Wiener Hoff equations-Recursive estimators-Kalman filter-Linear prediction, prediction error-whitening filter, inverse filter-Levinson recursion, Lattice realization, and Levinson recursion algorithm for solving Toeplitz system of equations.

4. ADPATIVE FILTERS **9**

FIR adaptive filters-Newton's steepest descent method - adaptive filter based on steepest descent method-Widrow Hoff LMS adaptive algorithm- Adaptive channel equalization-Adaptive echo chancellor-Adaptive noise cancellation-RLS adaptive filters-Exponentially weighted RLS-sliding window RLS-Simplified IIR LMS adaptive filter.

5. MULTIRATE DIGITAL SIGNAL PROCESSING **9**

Mathematical description of change of sampling rate - Interpolation and Decimation - continuous time model - Direct digital domain approach - Decimation by an integer factor - Interpolation by an integer factor - Single and multistage realization - poly phase realization - Application to sub band coding - Wavelet transform and filter bank implementation of wavelet expansion of signals.

Total No of periods: 45

AX131 Advanced Digital Signal Processing **3** **0** **0** **100**

Text Book:

1. Monson H.Hayes, " Statistical Digital Signal Processing and Modeling ", John Wiley and Sons, Inc., New York, 1996.

References:

1. Sopocles J.Orfanidis, " Optimum Signal Processing ", McGraw Hill, 1990.
2. John G.Proakis, Dimitris G.Manolakis, " Digital Signal Processing ", Prentice Hall of India, 1995.

CM031	**Network Routing Algorithms**	**3**	**0**	**0**	**100**

1. CIRCUIT SWITCHING NETWORKS **9**

AT & 's,Dynamic alternative routing.

2. PACKET SWITCHING NETWORKS **9**

Distance vector routing,Inter domai routing,Link state Routing,Apple talk routing & Sna Routing

3. HIGH SPEED NETWORKS **9**

Routing in optical networks,Routing in ATM networks,Routing in PLANET networks &Deflectuion Routing

4. MOBILE NETWORKS **9**

Routing in cellular radio mobile communication networks,Packet radio Routing

5. MOBILE AD-HOC NETWORKS(MANET) **9**

Internet based mobile ad-hoc networking,communication strategies,routing algorithms Destination sequenced Distance Vector(DSDV),Dynamic source Routing (DSR),Ad-hoc On demand Distance Vector(AODV) & TemporarilyOrdered Routing algorithm (TORA),Quality of service

Total No of periods: 45

CM031 Network Routing Algorithms **3** **0** **0** **100**

References:S:

1. M.Steen Strub, Routing in Communication networks,Prentice Hall International New York,1995
2. William Stallings,High speed Networks TCP/IP and ATM Design Principles,Prentice Hall,New York,1998.
3. IEEE Journal on Selected areas in Communications,Special issue on Wireless Adhoc Networks,Vol 17,No.8,1999
4. Scott.M., Corson, Joseph.P. Macker, Gregory.H.Cirincione,IEEE Internet Computing Vl.3,No.4,Jul-Aug 1999
5. Alder.M.. Scheideler.Ch.Annual ACM Symposium on Parallel Algorithms and Architectures,ACM,New York 1998.

CM032	**Network Management**	**3**	**0**	**0**	**100**

1. FUNDAMENTALS OF COMPUTER NETWORK TEHNOLOGY **9**

Network Topology,LAN,Network node components-Hubs,Bridges,Routers,Gateways,Switches,WAN,ISDN-Transmission Technology,Communications protocols and standards

2. OSI NETWORK MANAGEMENT **9**

OSI Network management model-Organizational model-Information model,communication model.Abstract Syntax Notation - Encoding structure,Macros Functional model CMIP/CMIS

3. INTERNET MANAGEMENT(SNMP) **9**

SNMP-Organizational model-System Overview,The information model,communication model-Functional model,SNMP proxy server,Management information ,protocol remote monitoring

4. BROADBAND NETWORK MANAGEMENT **9**

Broadband network s and services,ATM Technology-VP,VC,ATM Packet,Intergrated service,ATMLAN emulation,Virtual Lan.ATM Network Management-ATM Network reference model,Intergrated local management Interface.ATM Management Information base,Role of SNMD and ILMIin ATM Management,M1,M2,M3,M4 Interface.ATM Digital Exchange Interface Management

5. NETWORK MANAGEMENT APPLICATIONS **9**

Configuration management,Fault management,peformance management,Event Corelation Techniques security Management,Accounting management,Report Management,Policy Based Management Service Level Management

Total No of periods: 45

CM032 Network Management **3 0 0 100**

References:

1. *Mani Subramanian, " Network Management Principles and practice ", Addison Wesly New York, 2000.*
2. *Salah Aiidarous, Thomas Plevayk, " Telecommunications Network Management Technologies and Implementations ", eastern Economy Edition IEEE press, New Delhi, 1998.*
3. *Lakshmi G. Raman, " Fundamentals of Telecommunication Network Mnagement ", Eastern Economy Edition IEEE Press, New Delhi, 1999.*

CM033 High Speed Switching Architecture **3 0 0 100**

1. HIGH SPEED NETWORK **9**

Introduction-LAN,WAN,Network evolution through ISDN to B-isdn,Transfer mode and control of B-ISDN,SDH multiplexing structure,ATM standard,ATMadaptation layers

2. LAN SWITCHING TECHNOLOGY **9**

Switching concepts,switch forwarding techniques,switch path control,LAN switching,cut through forwarding,store and forward,virtual LANs

3. ATM SWITCHING ARCHITECTURE **9**

Switch models,Blocking networks- basic-and-enhanced banyan networks,sorting networks-merge sorting,re-arrangeable networks-full-and-partial connection networks,non -blocking networks-Recursive network construction,comparison of non-blocking network,switches with deflection routing-shuffle switch,tandem banyan

4. QUEUES IN ATM SWITCHES **9**

Internal Queuing-Input,output and shared queuing,multiple queuing networks-combined input,output and shared queuing -performance analysis of Queued switches

5. IP SWITCHING **9**

Addressing model,IP Switching types-flow driven and topology driven solutions ,IP Over ATM address and next hop resolution,multicasting,Ipv6 over ATM

Total No of periods: 45

CM033 High Speed Switching Architecture 3 0 0 100

References:S:

1. Achille Pattavina,Switching Theory:Architectures and performance in Broadband ATM Networks,John Wiley & Sons Ltd.,New York.1998
2.Christopher Y Metz,Switching protocols & Architectures,McGraw Hill Professional publishing,New York.1998
3. Ranier Handel,Manfred N Huber,Stefan Schrodder,ATM Networks-concepts,protocols,applications,3rd Edition,Adisson Wesley,New York,1999

CM034 Simulation of Communication Systems and Networks 3 0 0 100

1. MODELLING OF COMMUNICATION SYSTEM 9

Model of speech and picture signals,Pseudo noise sequences,Non-linear sequences,Analog channel model,Noise and fading,Digital channel model-Gilbert model of bustry channels,HF,Troposcatter and satelite channels,Switched telephone channels,Analog and Digital communication system models,Light wave system models.

2. SIMULATION OF RANDOM VARIABLES AND RANDOM PROCESS 9

Univariate and multivaraiate models,Transformation of random variables,Bounds and approximation,Random process models-Markov AND aARMA Sequences,Sampling rate for simulation,Computer generation and testing of random numbers

3. ESTIMATION OF PERFORMANCE MEASURES 9

Quality of an estimator,estimator fo SNR,Probability density functions of analog communication system,BER of digital communication systems,Montre carlo method and Importance sampling method,estimation of power spectral density of a process

4. COMMUNICATION NETWORKS 9

Queuing models,M/M/I and M/M/I/N queues,Little formula,Burke's theorem,M/G/I queue,Embedded Markov chain analysis of TDM systems,Polling,Random access systems

5. NETWORK OF QUEUES 9

Queeues in tandem,store amd forward communication networks,capacity allocation,Congestion and flow chart,Routing model,Network alyout and Relaiability

Total No of periods: 45

CM034 Simulation of Communication Systems and Networks 3 0 0 100

References:S:

1. M.C.Jeruchim,Philip Balaban and K.Sam Shanmugam, "Simulation of communication systems",Plenum Press,New York,1992
2. A.M.Law and W.David Kelton, "Simulation Modelling and analysis", Mc Graw Hill Inc.,New York ,1991
3. J.F.Hayes, "Modelling and Analysis of Computer Communiocation networks,Plenum Press,New York,1984
4. Jerry Banks and John S.Carson,Deiscrete-event system Simulation",Prentice Hall,Inc.,New Jersey,1984

CM035	**Global Tracking and Positioning Systems**	**3**	**0**	**0**	**100**

1. INTRODUCTION **9**

Satelites,Introduction to Tracking and GPS System,Applications of Satelite and GPS for 3D position,Velocity,determination as function of time,Interdisciplinary applications(eg,.Crystal dynamics,gravity field mapping,reference frame,atmospheric occulation)Basic concepts ofGPS.Space segment,Control segment,user segment,History of GPS constellation,GPS measurement charecteristics,selective availability(AS),antispoofing(AS).

2. ORBITS AND REFERENCE SYSTEMS **9**

Basics of Satelite orbits and reference systems-Two-body problem,orbit elements,timre system and timre transfer using GPS,coordinate systems,GPS Orbit design,orbit determination problem,tracking networks,GPS force and measurement models for orbit dtermination,orbit broadcast ephemeris,precise GPS ephemeris.Tracking problems

3. GPS MEASUREMENTS **9**

GPS Observable-Measurement types(C/A Code,P-code,L1 and L2 frequencies for navigation,pseudo ranges),atmospheric delays(tropospheric and ionospheric),data format(RINEX),data combination(narrow/wide lane combinations,ionosphere-free combinations,single,double,triple differences),undifferenced models,carrier phase Vs Intergrated Doppler,integer biases,cycle slips,clock error

4. PROCESSING TECHNIQUES **9**

Pseudo range and carrier phase processing,ambiguity removal,Least square methods for state parameter determination,relation positioning,dilution of precision

5. GPS APPLICATIONS **9**

Surveying,Geophysics,Geodsey,airborne GPS,Ground-transportation,Spaceborne GPS orbit determination,attitude control,meteorological and climate research using GPS

Total No of periods: 45

CM035 Global Tracking and Positioning Systems 3 0 0 100

References:S:

1. B.Hoffman - Wellenhof,H.Lichtenegger and J.Collins,"GPS: Theory and Practice ".4th revised edition,Springer,Wein,New york,1997
2. A.Leick,"GPS Satelite Surveying",2nd edition,John Wiley & Sons,NewYork,1995
3. B.Parkinson,J.Spilker,Jr.(Eds),"GPS:Theory and Applications",Vol.I & Vol.II,AIAA,370 L'Enfant Promenade SW,Washington,DC20024,1996
4. A.Kleusberg and P.Teunisen(Eds),GPS for Geodesy,Springer-Verlag,Berlin,1996
5. L.Adams,"The GPS.A Shared National Asset,Chair,National Accademy Press,Washington,DC,1995

CM036	**Communication Network Security**	**3**	**0**	**0**	**100**

1. CONVENTIONAL ENCRYPTION **9**

Introduction,Conventional encryption model,Steganography,Data Encryption Standard,block cipher,Encryption algorithms,confidentiality,Key distribution

2. PUBLIC KEY ENCRYPTION AND HASHING **9**

Principles of public key cryptosystems,RSA algorithm,Diffie-Hellman Key Exchange.Elliptic curve cryptology,message authentification and Hash functions,Hash and Mac algorithms,Digital signatures

3. IP SECURITY **9**

IP Security Overview,IP security Architecture,authentification Header,Security payload,security associations,Key Management

4. WEB SECURITY **9**

Web security requirement,secure sockets layer, transport layer security,secure electronic transaction,dual signature

5. SYSTEM SECURITY **9**

Intruders,Viruses,Worms,firwewall design,Trusted systems,antivirus techniques,digital Immune systems

Total No of periods: 45

CM036	**Communication Network Security**	**3**	**0**	**0**	**100**

References:S:

1. William Stallings,"Cryptography and Network security",2nd Edition,Prentice Hall of India,New Delhi,1999
2. Baldwin R and Rivest.R."TheRC5,RC5-CBC,TC5-CBC-PAD and RC5-CT5 Algorithms,RFC2040",October 1996

CM037	**Soft Computing**	**3**	**0**	**0**	**100**

1. ARTIFICIAL NEURALS **9**

Basic-concepts-single layer perception-Multi layer perception-Supervised and un supervised learning back propagation networks,Application

2. FUZZY SYSTEMS **9**

Fuzzy sets and Fuzzy reasoning-Fuzzzy matrices-Fuzzy functions-decomposition-Fuzzy automata and languages-Fuzzy control methods-Fuzzy decision making,Applications

3. NEURO-FUZZY MODELLING **9**

Adaptive networks based Fuzzy interfaces-Classification and Rpresentation trees-Data dustemp algorithm -Rule base structure identification-Neuro-Fuzzy controls

4. GENETIC ALGORITHM **9**

Survival of the fittest-pictures computations-cross overmutation-reproduction-rank method-rank space method,Application

5. SOFT COMPUTING AND CONVENTIONAL AI **9**

AI Search algorithm-Predicate calculu rules of interface - Semantic networks-frames-objects-Hybrid models-applications

Total No of periods: 45

CM037 Soft Computing **3 0 0 100**

References:S":

1.Jang J.S.R.,Sun C.T and Mizutami E - Neuro Fuzzy and Soft computing Prentice hall New Jersey,1998
2. Timothy J.Ross:Fuzzy Logic Engineering Applications.McGraw Hill,NewYork,1997.
3. Laurene Fauseett:Fundamentals of Neural Networks.prentice Hall India,New Delhi,1994.
4. George J.Klir and Bo Yuan,Fuzzy Sets and Fuzzy Logic,Prentice Hall Inc.,New Jersey,1995
5. Nih.J.Ndssen Artificial Intelligence,Harcourt Asia Ltd.,Singapore,1998.

CM038	**Electromagnetic Interference and Compatibility in System Design**	**3**	**0**	**0**	**100**

1. EMI ENVIRONMENT **6**

Sources of EMI, counducted and radiated EMI, Transient EMI, EMI-EMC Definitions and units of parameters.

2. EMI COUPLING PRINCIPLES **9**

Conducted, Radiated and Transient Coupling, Common Impedance Ground Coupling, Radiated Common Mode and Ground Loop Coupling, Radiated Differential Mode Coupling, Near Field Cable to Cable Coupling, Power Mains and Power Supply Coupling.

3. EMI SPECIFICATION / STANDARDS / LIMITS **7**

Units of specifications, Civilian standards Military standards.

4. EMI MEASUREMENTS **7**

EMI Test Instruments /Systems, EMI Test, EMI Shielded Chamber, Open Area Test Site, TEM Cell Antennas, Conductors Sensors/Injectors/Couplers, Military Test Method and Procedures, Calibration Procedures.

5. EMI CONTROL TECHNIQUES **7**

Shielding, Filtering, Grounding, Bonding, Isolation Transformer, Transient Suppressors, Cable Routing, Signal Control, Component Selection and Mounting.

6. EMC DESIGN OF PCBS **9**

PCB Traces Cross Talk, Impedance Control, Power Distribution Decoupling, Zoning, Motherboard Designs and Propagation Delay Performance Models.

Total No of periods: 45

CM038	**Electromagnetic Interference and Compatibility in System Design**	**3**	**0**	**0**	**100**

References:

1. Bernhard Keiser, " Principles of Electromagnetic Compatibility ", Artech house, 3rd Ed, 1986.
2. Henry W.Ott, " Noise Reduction Techniques in Electronic Systems ", John Wiley and Sons, 1988.
3. V.P.Kodali, " Engineering EMC Principles, Measurements and Technologies ", IEEE Press, 1996.

CM041	**Digital Communication Receivers**	**3**	**0**	**0**	**100**

1. REVIEW OF DIGITAL COMMUNICATION TECHNIQUES **9**

Base band and band pass communication,signal space representation,linear and nonlinear modulation techniques,and Spectral charecteristics of digital maodulation

2. OPTIMUM RECIEVERS FOR AWGM CHANNEL **9**

Corelation demodulator,matched filter , maximum likelihood sequence detector,optimum reciever for CPM signals,M-ary orthogonal signals,envelope detectors for M-ary and corelated binary signals

3. RECIEVERS FOR FADING CHANNELS **9**

Charecterization of fading multiple channels,statistical models,slow fading,frquency selective fading,, diversity technique,RAKE demodulator,coded waveform for fading channel

4. SYNCHRONIZATION TECHNIQUES **9**

Carrier and signal synchronization,carrier phase estimation-PLL,Decision directed loops,symbol timing estimation,maximum likelihood and non-decision directed timing estimation,joint estimation

5. ADAPTIVE EQUALIZATION **9**

Zerofacing algorithm,LMS algortihm,adaptive decsion-feedback equalizer and Equalization of Trellis-coded signals.Kaiman algorithm,blind equalizers and stochastic gradient algorithm.Echo cancellation

Total No of periods: 45

CM041 Digital Communication Receivers **3** **0** **0** **100**

References:

1. *Heinrich Meyer, Mare Moeneclacy, Stefan.A.Fechtel, " Digital communication recievers ", Vol I & Vol II, John Wiley, New York, 1997.*
2. *John.G.Proakis, " Digital communication " 4th Edition, McGraw-Hill, New York, 2001.*
3. *E.A.Lee and D.G.Messerschmitt, " Digital communication ", 2nd Edition, Allied Publishers, New Delhi, 1994.*
4. *Simon Marvin, " Digital communication over fading channel; An unified approach to performance Analysis ", John Wiley, New York, 2000.*

OC041	**RF System Design**	**3**	**0**	**0**	**100**

1. INTRODUCTION **9**

RFcircuits,Impedance matching and Quality factor,Efficiency,Amplifiers,RF preamplifiers , filters,Frequency converters,Mixers,Radio recievers

2. OSCILLATORS AND PLL **9**

Relaxation oscillators,Series resonant oscillators,Negative resonant oscillators,Oscillator dynamics,Stability,oscillator noise,Design examples,phase locked loops-loop dynamics,analysis,Frequency synthesisers

3. AMPLIFIERS AND POWER SUPPLIES **9**

Amplifier specifications-gain,bandwidth and impedance,stability,Amplifier design,Noise considerations.class C class D amplifiers,High power amplifiers.Rectifiers,Switching converters,Boost and Buck circuits

4. COUPLERS AND WAVEGUIDE CIRCUITS **9**

Directional coupling,Hybrids,Power combining,transformer equivalent circuits,Double tuned transformers,Transformers with magnetic and iron cores.Transmission lines ,transformersand Baluns.Waveguides,matching in wave guide circuits,Waveguide junctions,coaxial lines,resistance impedance bridge,standing waves.

5. MODULATION AND DETECTION CIRCUITS **9**

AM,High level modulation,Digital to analog modulation,SSB,Angle and frequency modulation,Diode detectors,FM demodulators-Design.power detectors.Measurement of power,Voltage and Impedance.Swept frequency impedance measurements

Total No of periods: 45

OC041 RF System Design **3 0 0 100**

References:

1. Jon B. Hagen, " Radio Frequency Electronics ", Cambridge university press, Cambridge, 1996.
2. James Hardy, " High Frequency Circuit Design ", Resto Publishing Co., NewYork, 1979.
3. Ian Hickman, " RF HandBook ", Butter Worth Heinemann Ltd., Oxford, 1993.
4. Ulrich L.Rohde, T.T.N.Bucher, " Communication Recievers ", McGraw-Hill, New York, 1998.
5. R.Ludcoig " RF Circuit Design ", Pearson Asia Education and P.Bretchko, New Delhi, 2000.

OC041	**RF System Design**	**3**	**0**	**0**	**100**

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OC041	**RF System Design**	**3**	**0**	**0**	**100**